

closed by means of strips of fur, and dried interiorly with chloride of calcium, so that in all weathers the machine acts well.

HERR ZEHFUSS has lately given (*Wied. Ann.*, 4) some personal experiences of the phenomenon of "after images of motion" (about which Plateau and Oppel have before written). These after images may be had, e.g., in a train, if one look at a point on the horizon for a little, then turn to look at (say) a horizontal fibre in the wood of the carriage, or close one's eyes. Motions then seem to be still perceived; in the latter case, e.g., a stream of sparks seems to be moving to the right (or if the point originally looked at have been between the observer and the horizon, there is a stream of sparks above going to the right and one below to the left). Herr Zehfuss offers a physiological explanation, in preference to the partly psychical ones proposed by Plateau and Oppel. Each individual nerve rod, he supposes, has special blood-vessels, which, when the original image of a moved object goes to the right, directs the course of the blood to that side, just as in ordinary light the decomposed blood is promptly replaced by fresh. By this preponderant direction of blood to the right a heaping up occurs in each retinal element on the right, which gives rise to return currents as soon as the outer cause has ceased to act. As the blood flows back there arise, in consequence of the specific excitability of the rods, those spark-streams, which are projected as elementary motions to the right.

IN a recent number of *Wiedemann's Annalen* (3) Herr Schönn describes a method of making visible ultra-violet prismatically decomposed light in such a way that exact measurements can be made. One feature of it is the use of a disk of fine calking paper saturated with sulphate of quinine, and contained in a small cell which is brought close before the Ramsden ocular, which can be directed at once on the disk and on a luminous line (its axis is not inclined like that of Soret's, but coincides with the axis of the telescope). The author gives measurements of the ultra-violet spectrum of cadmium, zinc, and thallium.—In the same number Herr Glan describes a "spectro-telescope," with which objects can be seen in any homogeneous colour at will. The instrument has various applications, especially in astrophysics.

IN a paper on the thermic theory of the galvanic current (*Wied. Ann.*, No. 4) Herr Hoorweg lays down the following propositions:—Wherever two conductors come into contact, motion of heat results in development of electricity; therefore a constant electric difference arises between the two substances. 2. If in a closed circuit, the total sum of the differences of potential be different from zero, there arises in this circuit a continuous electric current. 3. This current exists at the cost of the heat at one part of the point of contact, and has heat-production in the other for a result. 4. All voltaic currents are thermo-currents. 5. The chemical action in the battery and the decomposition apparatuses is a result of the galvanic current.

AN interesting series of experiments has been recently made by Dr. König on the vibrations of a normal tuning-fork (*Wied. Ann.*, No. 3). He finds that, practically, at least to 50° to 60° of heat, the influence of heat on a tuning-fork may be regarded as constant. Thick tuning-forks are more affected by heat than thin ones of the same pitch, indicating (it is remarked) that change of elasticity, and not change of the length of the arms, is the primary cause of the change of pitch. The influence of heat on tuning forks of different pitch, and of not very different thickness, is proportional to their number of vibrations. Generally the period of vibration of a tuning-fork is increased or diminished $\frac{1}{273}$ by a difference of temperature of 1° centigrade. The general change in pitch of the normal fork $U_3 = 512$ vibrations per second at 20°, through the temperature difference of 1° C. is 0.0572 vibrations per second. Dr. König has constructed a fork which, at any temperature, will exactly give 512 vibrations.

SOME quotations by Herr Oehler (*Wied. Ann.*, No. 3) from Jacob Hermann's work, "*Phoronomia sive de Viribus*," &c., published in 1716, have a curious significance in relation to the history of the mechanical theory of heat. In the twenty-fourth chapter, "*De motu intestino fluidorum*," the following paragraph occurs:—"Hoc nomine non intelligitur hoc loco internus molecularum motus fluidi cujuscunque in suo statu naturali consistentis, sed is particularum motus, qui in fluidis a causis externis et accidentalibus excitari solet, quo calor præsertim est referendus, qui dubio procul ex concitatore particularum motu

in corpore calido a causis externis producitur. Utut vero ejusmodi motus intestinus admodum perturbatus sit, nihilo tamen minus regula physice satis accurata pro ejus mensura media tradi potest. In another place Hermann offers a demonstration of the theorem that "*Calor, cæteris paribus, est in composita ratione ex densitate corporis calidi, et duplicata ratione agitationis particularum ejusdem.*"

GEOGRAPHICAL NOTES

LIEUT. A. LOUIS PALANDER, of the Swedish Royal Navy, was last week elected a Corresponding Member of the French Geographical Society, in acknowledgment of his brilliant services to geography as commander of the *Vega* during the late Arctic Expedition. We understand that the Swedish Royal Academy of Sciences have just caused a handsome bronze medal to be struck in commemoration of the successful accomplishment of this enterprise. This medal shows on one side the heads of Prof. Nordenskjöld and Lieut. Palander, and on the other a well-executed representation of the *Vega* surrounded by ice.

AT the Anniversary Meeting of the Geographical Society, on Monday next, the Earl of Northbrook will take the chair for the last time, and will deliver an address on recent geographical progress. The formal presentation of the Royal Medals will also take place at this meeting, though neither of the recipients (Lieut. Palander and Mr. Ernest Giles) can be present. The Duke of Edinburgh, Honorary President of the Society, will preside at the Anniversary Dinner in the evening, which will be held, as usual, at Willis's Rooms.

LORD ABERDARE, it is understood, will succeed the Earl of Northbrook as President of the Geographical Society.

A BEGINNING is about to be made to carry out Lieut. Weyprecht's proposal for a circle of observing stations around the North Polar region. The Danish Government has resolved to establish a station at Upernivik, in West Greenland; the Russian Government has granted a subsidy for an observatory at the mouth of the Lena, and another on the new Siberian Islands; Count Wilczek is to defray the expenses of a station on Novaya Zemlya under the direction of Lieut. Weyprecht; the U.S. Signal Service, under General Myer, has received permission to plant an observatory at Point Barrow, in Alaska; and it is expected that Canada will have a similar establishment on some point of her Arctic coast. At the Hamburg Conference it was announced that Holland would furnish the funds for a station in Spitzbergen; and it is expected that Norway will have an observing post on the extremity of the Province of Finnmark. This is a good beginning, and we hope that some sort of agreement will be established to have all the observations made after a uniform method, otherwise their value will be greatly decreased.

BARON EGGERS, of St. Thomas, West Indies, sends is a prospectus of a plan for the scientific exploration of the West Indies, especially as regards their natural history, his main purpose evidently being to make complete collections of plants, insects, and shells. Such collections he offers at certain rates to all who express their wish to become subscribers, the subscription to be paid on delivery of the collections. Details may be obtained from Baron Eggers or from his agent in Europe, Dr. Eug. Warming, Copenhagen.

M. PAUL SOLEILLET, who was compelled to return to Senegal in his attempt to reach Timbuctoo, is now in Paris, and expresses his determination to embark again in July, to make another attempt.

A SOCIETY of Geography for the north of France has been established at Douai.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—The election to the Professorship of Mineralogy, vacant by the death of Dr. W. H. Miller, F.R.S., will be held in the Senate House on June 12.

In the fourteenth Annual Report of the Museums and Lecture-Room Syndicate, Lord Rayleigh, the recently-appointed Professor of Experimental Physics, says:—"On visiting the Cavendish Laboratory in December last, after my appointment to the Professorship of Experimental Physics, I was at once struck with the

great deficiency of apparatus. The building itself appears to me to be very convenient and adequate to its purpose, but the advantages which it should afford cannot be fully realised without a large addition to the existing stock of apparatus. Even with an adequate outfit, a considerable annual expenditure is necessary for renewals and to meet the wants of students engaged in original research. Knowing that the University is not likely for several years to be in a position to meet the want, and feeling that Cambridge ought not to remain in this respect behind several Continental and American Universities, I have been endeavouring to raise an apparatus fund, to be spent in eight or ten years at the discretion of the Professor, by inviting contributions from persons interested in Cambridge and in science. I have been fortunate enough to secure the co-operation of the Chancellor, to whom the University is already indebted for the building and for most of our existing apparatus; and the proposal has met with such a degree of support from others that it may be considered to be already a partial success. It is difficult to form an exact estimate beforehand, but I should suppose that 2,500*l.* will be required during the next ten years to put the institution upon a proper footing." Lord Rayleigh announces that he has received promises and donations amounting to 1,825*l.*

In connection with the Science and Art Department at South Kensington the following courses of instruction for science teachers will probably be organised this summer:—(1) Chemistry, from July 7 to 29, Dr. W. R. Hodgkinson. (2) Light, from June 29 to July 14; (3) Magnetism and Frictional Electricity, from July 15 to 30, Prof. Guthrie, F.R.S. (4) Applied Mechanics, from June 30 to July 22, Prof. Goodeve, M.A. (5) Geology, from June 30 to July 22, Prof. Judd, F.R.S. (6) Botany, from July 7 to July 29, Prof. W. T. Thiselton Dyer, F.R.S.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, May 13.—Abstract of paper "On the Chemical Composition of Aleurone-Grains," by Dr. Vines.

This paper continues the account of this investigation, which appeared in the *Proceedings* for 1878. It was therein shown that the aleurone-grains of the Lupin consist of three proteid substances, namely, of two globulins—the one belonging to the myosin group, the other to the vitellin group—and of a substance, allied to the peptones, provisionally termed hemialbumose. In the present communication the results of the investigation of the grains of the peony and of the castor-oil plant (*Ricinus*) are given. The grains of the peony are found to be readily soluble in distilled water. Treatment with 10 per cent. NaCl solution, however, proves the existence of a myosin-globulin. Apparently no vitellin-globulin is present. The grains contain hemialbumose in considerable quantity. The grains of *Ricinus* present a complex structure. They consist of a mass of ground-substance of proteid nature, inclosing a crystalloid of proteid substance and a globoid which consists of inorganic matter. The ground-substance is found to be composed, like the grain of the Lupin, of the two globulins and of hemialbumose. The chemical nature of the crystalloid is not so clearly made out. It is slowly soluble in 10 per cent. NaCl solution, and readily soluble in 20 per cent. or in saturated NaCl solution after treatment with alcohol. The crystalloids of several plants were investigated with the view of ascertaining their relative solubility in solutions of this salt. Those of *Viola elatior* and of *Linum usitatissimum* were found to resemble those of *Ricinus* in this respect; those of *Bertholletia* and of *Cucurbita* are readily soluble in 10 per cent., and saturated NaCl solutions; those of *Musa ensata* and *hillii* and those of *Sparganium ramosum* are either insoluble or only partially soluble in these solutions.

The points of more general interest are the action of alcohol in promoting the solution of the crystalloids of *Ricinus* in 20 per cent. and in saturated solutions of NaCl, and the fact that long-continued exposure to alcohol does not render the vegetable globulins insoluble in these solutions.

The author finally expresses his opinion that the caseins which Ritthausen has extracted from various seeds consist to a considerable extent of precipitated hemialbumose.

Physical Society, May 8.—Sir William Thomson, president, in the chair.—New Members: E. F. Bamber, Dr. E. Obach, R. D. Turner, E. Woods, H. E. Roscoe, H. Watts.—Prof.

Minchin, of Cooper's Hill Engineering College, described his further researches on the subject of photoelectricity, brought by him before the last meeting of the Society. He has found that the current in a sensitive silver cell does not always flow from the uncoated to the coated plate. It does when chloride or bromide of silver is used, but when the sensitive emulsion is iodide of silver and the liquid water tinctured with iodide of potash, the current is from the coated to the uncoated plate. He demonstrated that the current set up by the fall of light on the cell could be sent by wire to a receiving cell, and made to produce a local effect on the sensitive plate therein. He also proved that electricity is developed in fluorescent bodies by the action of light, and hopes to show that it is also developed in phosphorescent bodies. Neither heat nor the red rays produce this electricity, but it is the blue and violet rays which do so. The fluorescent silver plates he employed were coated with an emulsion of eosine and gelatin, and had been kept sensitive for twelve days. They would thus be a permanent source of photoelectricity, did the eosine not tend to leave the gelatin. Mr. Wilson had suggested naphthalene red for eosine, as not apt to leave the gelatin, and he had found it give good results.—Dr. O. S. Lodge described certain improvements which he had made in his electrometer key designed for delicate electrical and especially electrostatic experiments. Assisted by the British Association, he had made it more convenient, and fitted it into an air-tight case which could be artificially dried. The contact-pins were now of phosphor-bronze gilt instead of platinum, and the contacts were made by press-pins from the outside. Dr. Lodge also exhibited a new inductometer or modified form of Prof. Hughes's induction balance, combining a Wheatstone balance, and expressly designed for comparing capacities and resistances, especially the resistances of coils having no self-induction. A telephone takes the place of a galvanometer in the bridge, and the current in the primary coil is interrupted by a clockwork make and break. There is one primary coil of fine wire 34 ohms in resistance and two secondaries, one on each side of it, of fine wire, each about 270 ohms. These are fixed, but the primary is adjustable by a screw. Prof. Hughes remarked that he had pointed out in his paper to the Royal Society that the induction-balance could be used in this way; and Dr. Lodge disclaimed any novelty in the apparatus beyond its arrangement. Sir W. Thomson added that it was satisfactory to see so serviceable an adaptation of the induction-balance to research.—Dr. Hopkinson, Prof. Perry, and Sir W. Thomson offered remarks on the element of time in comparing discharges from condensers of different dielectrics. Sir William said that, in 1864, he had made experiments on air and glass dielectrics, and found the discharge about the same for the first quarter-second.—Prof. Adams then took the chair, and Sir W. Thomson made a communication on the elimination of air from a water steam-pressure thermometer, and on the construction of a water steam-pressure thermometer. He said it was a mistake to suppose that air was expelled by boiling water, because the water dissolved less air when warm than when cold. The fact was due to the relations between the density of air in water and the density of air in water vapour. There was fifty times more air in the water vapour over water in a sealed tube than in the water below. If this air could be suddenly expelled only $\frac{1}{50}$ th part of air would remain, and of this only $\frac{1}{50}$ th in the water, the rest being in the vapour. This suggested a means of eliminating air from water, which he had employed with success. It consisted in boiling the water in a tube, and by means of a fluid mercury valve allowing a puff of the vapour to escape at intervals. Sir W. Thomson also described his new water-steam thermometer now being made by Mr. Casella. It is based on the relations of temperature and pressure in water-steam as furnished by Regnault's or other tables, and will consist of a glass tube with two terminal bulbs, like a cryophorous, part containing water, part water-steam, and the stem inclosed in a jacket of ice-cold water. Similar vapour-thermometers will be formed, in which sulphurous acid and mercury will be used in place of water, or in conjunction with it. For low or ordinary temperatures they will be more accurate than ordinary thermometers.

Geological Society, May 12.—Robert Etheridge, F.R.S., president, in the chair.—Rev. Samuel Gasking, Thos. J. George, and Cuthbert Chapman Gibbs, M.D., were elected Fellows of the Society.—The following communications were read:—On the structure and affinities of the genus *Protospongia*, Salter, by W. J. Sollas, F.G.S.—Note on *Psephophorus polygonus*, von Meyer, a new type of Chelonian reptile allied to the leathery